

Westbrook (B. F.)

Treatment of Fever.

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EPISCOPAL HOSPITAL.

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TREATMENT OF FEVER.*

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FEVER, strictly defined, is any abnormal elevation of the temperature of the body, and the discussion of its treatment if limited to the strict application of the term would imply merely the discussion of the means at our command for the restoration of the disturbed heat equilibrium to the normal standard. But in the practice of the healing art it is but seldom that we meet with instances in which abnormal elevation of temperature is the only pathological condition which demands the exercise of our skill. As a matter of fact, the pyrexia is almost always associated with other symptoms which demand as close attention as does the fever itself. Indeed, the concurrent circumstances are frequently of such a character that the simple elevation of temperature falls into a secondary place, and our attention must be directed to the combating of morbid processes which are far more serious and threatening to the life of the patient.

In order to be able to cope with these dangerous mala-

* Read before the Medical Society of the County of Kings, December 20, 1887.

dies the physician should enter upon his work fully equipped with a knowledge of their nature and causes, and of the means which we have at our command for partially or completely nullifying their injurious influences upon the human body. He should have sufficient knowledge of the pathological and clinical history of disease, not only to fully appreciate the significance of the symptoms by which he is confronted at a given time, but also to anticipate the difficulties and dangers by which they are likely to be followed. Practically, therefore, the treatment of fever involves the management of many different forms of disease, and of every variety and combination of morbid physiological phenomena. In order to render the subject as clear as possible, I shall begin with the discussion of the simplest forms of fever, and then take up the more complicated.

The purest type of fever that is known to clinical observers is that to which attention was first called by Genzmer and Volkmann in 1877,* and which was denominated by them *febris simplex*, or *aseptic fever*. Volkmann found that, after subcutaneous operations and injuries such as fractures, dislocations, etc., a rise in the temperature of the body occurred, lasting from twenty-four hours to a week or even longer. This elevation of temperature, which frequently attained a height of from 103° to 104° F., was ushered in by no premonitory symptoms; no disturbance of the nervous centers was observed beyond an occasional slight headache or feeling of malaise; patients usually made no complaint whatever, but seemed to retain their ordinary feeling of well-being, and the existence of fever was only determined by the objective examination of the surgeon. There were, however, certain symptoms present which may be considered as always accompanying a pyrexial temperature when

* "Sammlung klinischer Vorträge," No. 121, 1877.

their development is not interfered with by other morbid states. These are increased frequency of pulse and respiration, increased excretion of carbonic acid and the nitrogenous ingredients of the urine, particularly urea, and a slight diminution of the normal secretions of the body. The tongue was usually slightly if at all coated, the digestion not noticeably impaired, and the appetite not diminished. There was, however, an increase of thirst, and the skin was moist though not sweating. A similar febrile process is said to follow occasionally upon cutting operations performed with antiseptic precautions. The disease is one which requires no treatment. The points of interest are: that in spite of the considerable elevation of temperature which obtains in many cases, there are no symptoms referable to the nervous centers with the exception of those directly involved in the production of the febrile temperature. There are no marked disturbances of the functions of the alimentary canal, and there are none of the pulmonary or other complications that are observed in the more serious febrile diseases.

The form of fever most nearly resembling this with which medical practitioners have to deal, is the so-called ephemera, or simple continued fever. By this term I mean to indicate a febrile condition of rapid onset and brief duration, unaccompanied, as a general rule, by serious complications, and depending for its production on various causes. It is most commonly the result of disordered states of the alimentary canal, resulting from the introduction of indigestible or irritating substances, from fatigue, and from exposure to cold or heat. In children it is often a consequence of very slight disturbances, and in such cases is of very short duration. It is also observed in tropical regions, and during the heated term in the temperate zone as a direct effect of the action of intense heat upon the nervous

system. This latter form of the disease is known as ardent continued fever. It is manifested by a rapid rise in temperature, sometimes to the height of 104° or 105° F., accompanied by increased rapidity of the pulse and respiration, increased excretion of urea, with a diminution in quantity and rise in the specific gravity of the urine, a dry, hot skin, and diminution of the secretion of the digestive fluids. The tongue is usually more or less coated, the patient complains of thirst, and there is usually some headache and feeling of weariness and restlessness. More intense nervous symptoms, such as delirium, coma, and convulsions, are only found in children, in those who have a predisposition to these symptoms, and in cases which result from the action of excessive heat. This simple form of continued fever has no exact pathological identity such as distinguishes those which result from a specific infection, but is to be regarded simply as a pyrexia due to a variety of causes. It results from this that for the practical physician to make a simple diagnosis of ephemeral fever is not sufficient. The pyrexia of itself involves little if any danger to life, and the most important duty of the diagnostician is to determine its cause, as it is upon this that the rational treatment of the disease must be based. If the disorder is observed in an infant or child, and alarming symptoms, such as great restlessness and jactitation, delirium, coma, or convulsions, present themselves, while some means must be adopted for their speedy relief, it should not be forgotten that they are probably dependent for their origin upon the presence of undigested food or other irritating substance in the stomach or intestine, and that the cure of the case will only be affected by the spontaneous or artificial removal of these matters. If convulsions be actually present, steps should be taken to subdue them before anything else is done, as they involve a direct and immediate danger to life. The means

for this are so well known that it is unnecessary for me to discuss them. After the convulsions have been quieted and the alimentary canal emptied as far as possible by the action of emetics, enemata, and the subsequent exhibition of a cathartic, other remedies may be employed for the control of the febrile symptoms. The pyrexia itself, however, will rarely need specific medication, and such agents as will contribute to the amelioration of the concomitant phenomena, such as the arterial excitement and the restlessness or delirium, are all that are necessary. In adults, in whom the fever is almost always caused by digestive disturbances, the therapeusis should be based upon the exciting cause. A brisk cathartic, followed by some measures calculated to soothe the irritated condition of the alimentary canal, will usually be all that is necessary, though here too, if the arterial excitement be high and the patient complain of headache or sleeplessness, the bromides, aconite, and veratrum viride may be given according to the discretion of the practitioner. Antipyrine and antifebrine have been found to have a sedative and analgesic effect in addition to their power to reduce temperature, and a moderate dose, late in the evening, will frequently induce sleep and probably hasten recovery. But the elevation of temperature in itself requires little or no treatment. The fever which results from overheating of the body is usually intense, and is complicated by the danger of inflammation of the brain or its meninges. Such cases require a more active treatment addressed to the nervous system itself. Another morbid condition, which stands midway between the aseptic fever of Volkmann and the infectious diseases, is the ordinary surgical or wound fever. This is observed during the interval which intervenes between the reception of the wound and the establishment of suppuration. It probably results from the absorption of morbid products from the swollen and infiltrated

tissues. It usually supervenes in from twenty-four to forty-eight hours after the occurrence of the operation or injury. The temperature mounts rapidly, but seldom reaches a dangerous height. The other symptoms are those which accompany simple fever; but the more serious manifestations of disturbance of the central nervous system may present themselves, though usually to only a moderate extent. They are generally limited to a delirium more or less pronounced, in accordance with the gravity of the case and the susceptibility of the patient, and to a greater restlessness and greater liability to complications than is observed in simple fever.

The essential fevers differ from those already considered in that they present themselves to us as more distinct pathological entities. In these diseases we have to deal not only with a disorder of the ordinary functions of the body, but also with a specific agent which underlies the visible phenomena, and stands to them in the relation of an efficient cause. The treatment of these diseases, therefore, should be both general and specific. Unfortunately, however, in the majority of them, the infecting germ or substance has not been discovered, or, if it is known, no means have as yet been found by which it can be neutralized or destroyed without at the same time destroying the body upon which it preys. There are, however, at least two of this class which may be treated specifically—viz., rheumatism and malarial fever. Rheumatism, which is due to the accumulation of an organic acid, probably lactic acid, in the body, yields to the action of the alkalies, and this treatment, first proposed by Fuller, is to-day, when properly carried out, thought by many to be the best that we have. In salicylic acid Buss has given us another specific remedy, but whether it is as valuable as the alkalies is still undetermined. The use of the alkalies or salicylates in rheuma-

tism, and of quinine in malarial fevers, is followed by such a marked amelioration of all the symptoms that it is usually not necessary to resort to any other medication, unless it be for the purpose of improving the condition of the digestive apparatus, or, in some instances, to relieve unusually severe nervous symptoms or combat complications. It is noteworthy that in these affections the fever of itself, though running high, seldom requires any special antipyretic treatment. If the cause is removed or neutralized, the pyrexia and all of its accompanying symptoms promptly subside. It is true that quinine, which acts so efficiently upon the malarial infectious germ, is also an antipyretic; but it is also true that the doses necessary for its cure are not large enough to reduce the temperature to the same extent in any other febrile malady. It is also true that the salicylates are active and efficient antipyretics, but it is not probable that it is through their antipyretic influence that they combat the rheumatic condition, because the alkalies, which have no marked effect upon the temperature of the body, are equally good in the treatment of this disease. It is also interesting to observe that quinine will not reduce the temperature of rheumatism as it does that of the malarial fevers, and that the converse holds with regard to the salicylates.

In the management of the other specific fevers, diphtheria, measles, scarlet fever, and typhus abdominalis, we have to rely entirely upon our general therapeutic resources, though we may entertain the hope that in the future some specific remedies may also be discovered for the relief of these diseases.

The treatment resolves itself into the proper hygienic management of the patient and the adoption of measures to mitigate his sufferings and avert or control the dangerous symptoms and complications.

In regard to the hygienic management I will content

myself with a few observations on the subject of diet. First, water: The thirst by which fever patients are tormented represents undoubtedly an actual need of the body for more fluid, though it is no doubt intensified and rendered abnormally great by the dryness of the mouth, stomach, and intestines. It should be our aim, therefore, to administer sufficient to supply the actual needs of the organism without entirely yielding to the voracious demands of the sufferer, as an excessive imbibition of water is apt to disturb the stomach and produce emesis and to take away the appetite for more strictly nourishing substances. The nurse should be instructed to give water in small quantities in the intervals between the administration of other foods, and this whether the patient requests it or not. The latter rule is imperative in instances presenting the typhoid condition, because the obtundity of the senses is so great that such persons frequently fail to recognize their own wants. Care should be taken that the water given is pure, and for this reason it is better not to use the ordinary ice-water, as the presence of bacteria and other spores in the ice delivered at our houses is quite constant, as has been shown by Dr. Prudden; and the abnormal condition of the stomach might favor their development and the accompanying fermentations and decompositions. If ice-water is needed it is better to fill bottles from the hydrant and put them on the ice. When vomiting is present, and it is thought well to give cracked ice, it would undoubtedly be best, where practicable, to have pure water frozen for the purpose on the premises. The addition of acids to the water would to a great extent overcome this difficulty. It has been suggested by Dr. Austin Flint, in his able paper on the "Pathology and Treatment of Fever," read before the Ninth International Medical Congress, that in febrile conditions there is an actual diminution of the production of water by combustion

in the body. This, if true, would furnish an additional and very important reason for its free administration. It is not, however, as far as I know, demonstrated that there is such a failure. It would seem, from the result of physiological experiments performed by himself and Dr. John C. Draper, that, during health, and particularly during short periods of fasting, water is one of the results of the oxidative processes. But whether diminished excretion of water in fever is to be taken as a sign of its diminished production, or simply indicates that it is retained in the body, is not proved. My impression is that Dr. Flint underestimates the amount of water given off by the bodies of febrile patients. It is true that the quantity of urine and perceptible perspiration, as well as the glandular secretions, are diminished, but this is to some extent compensated by the increased insensible transpiration from the skin, as demonstrated by Leyden, and by the greater frequency of breathing. Moreover, this diminution of the watery excretions is largely limited to the early days of the fever. In typhoid, for instance, in the second week the urine generally increases in quantity and diminishes in specific gravity, while sweating is much more pronounced than during the pyogenetic stage.

The other articles of diet should be given in fluid form, and it is the opinion of all writers upon the subject—and I believe of the profession generally—that they should be largely nitrogenous in their composition. Cases occur, however, in which bland, starchy substances, such as rice, arrow-root, barley-water, etc., agree very well. Dr. Flint thinks that it may be advisable to administer these hydrocarbonaceous substances more freely than has hitherto been the custom. He bases his argument for their use on their well-known efficacy in maintaining the temperature of the body during exposure to excessive cold. He thinks

that the demand for the production of heat causes such a destruction of the hydrocarbons of the body---viz., the adipose tissue—that their free administration might, to some extent, do away with this loss. The objections to their use have been based upon the inability of the febrile stomach and intestines to properly digest them, owing to the diminished secretion of the salivary, pancreatic, and intestinal juices. If this can be overcome, Dr. Flint's suggestion may prove to be a very valuable one. In health, the generation of heat occurs principally in the muscles, and this probably holds true also in fever, where an abnormally intense process of some kind is going on in the muscular substance. This pathological process is shown by the extensive degeneration which is found post mortem, though these changes differ somewhat in different diseases, and those found in fever are not the same as have been found by Litten and others in animals whose temperature has been simply raised by preventing a discharge of heat from the body. In the latter have been found extensive fatty degeneration, while in the former this change, if it occurs, is preceded by a granular albuminoid degeneration, or by an amyloid transformation. In order, however, to supply material for the carrying on of these processes in the muscles, the adipose tissue of the body is drawn upon very largely, and it is quite possible that the introduction of hydrocarbonaceous articles with the food might save the fatty tissues from such a rapid disintegration. At any rate, the experiment is well worthy of trial. The administration of nitrogenous substances is, however, of primary importance, as they will undoubtedly assist in recuperating the rapidly disorganizing muscles. Here, too, the question of assimilation comes up. When the toxæmia is intense, and its malign influence is exerted upon the glandular and digestive apparatus, even the simplest foods can not be digested and assimilated. It

then becomes necessary to avail ourselves of the assistance which science has recently rendered us in this emergency, and procure an artificial digestion of the aliments before they are introduced into the body. Armed with the means which we now have to overcome this difficulty, we are in far better condition than ever before to combat the inanition which always threatens those who are affected by long-continued or intense fever. I have no doubt that, by a systematic use of peptonized foods, the mortality from these diseases, and particularly from enteric fever, may be very considerably diminished. As an illustration of their value, I may mention the case of a physician affected with typhoid fever which ran for six weeks, with an evening temperature, for two or three weeks, of about 104° F., with only moderate morning remissions. The tongue remained moist and almost entirely clean throughout the entire course of the disease. This gentleman, for four or five weeks, took no other nourishment than peptonized milk. Though this is an exceptionally favorable instance, still I believe that such a result may frequently be approximated if the patient can be induced to adhere to the diet.

The question of the administration of alcohol in fever is also an important one, and may be appropriately discussed at this point, because of its occupying a position midway between food and medicine. When fevers assume the sthenic type, or when they run a mild and uncomplicated course, the administration of alcohol is not only unnecessary, but frequently inadmissible. It is also, I believe, a mistake to administer stimulants from the beginning of an attack in the hope of averting unfavorable consequences. When, however, the adynamic condition is well marked at any time in the course of the disease, and especially if the symptoms are those indicative of a typhoid condition, a free and regular administration of alcohol is at once called

for. Thus, in typhus fever, which is the type of the adynamic series, its administration should in many cases be begun as soon as the diagnosis is made. In measles, scarlet fever, and the early stages of enteric fever, alcohol is usually not indicated unless the adynamia is more than ordinarily pronounced. But in diphtheria, and in the latter half of most cases of typhoid, it is regarded by most practitioners as the best means we have for overcoming the depression of the vital powers. Dr. N. S. Davis, of Chicago, however, claims that, even in these instances, alcohol is unnecessary, and that equally good or better results may be obtained without its use. The particular indications for the administration of alcoholic stimulants in fever are cardiac weakness as evinced by indistinctness of the first sound and a feeble pulse, and jactitation or subsultus, which show that the integrity of the nervous system is impaired by the persistence of high fever or the intensity of the specific poison. Under such circumstances, the rule is to administer sufficient alcohol to overcome the symptoms.

In order to obtain the best results from its use, it should be prescribed in the same way as any other medicine, in definite doses given at stated intervals, very little reliance being placed upon the judgment of the attendants. It is not easy to say whether, under these circumstances, alcohol is or is not of value as a food. There are, however, some physiological and clinical facts which would seem to indicate that it is. Professor Flint, arguing from the standpoint of the physiologists, claims that it, like other hydrocarbons, is oxidized in the body with the production of force. It is also a matter of common observation that in typhoid conditions generally large quantities of alcohol may be taken into the body without their giving rise to any characteristic odor in the breath, and it is one of the old rules of practice that, as soon as this odor is discovered, the

dose should be diminished. It has been suggested by some that alcohol may have an antipyretic effect, but this is, to say the least, questionable.

In the further treatment of fever regard should be had to the nature of the infection, the pyrexia, and the condition of the special systems. In the typical septic fevers—such as pyæmia, septicæmia, and some of the puerperal diseases—the very free administration of alcohol has, according to the testimony of all observers, more or less of a specific curative influence.

Whether it actually affects the life of the infecting organisms, or whether it assists the tissues in resisting their attack, I do not know, but its good effects are so remarkable that its use in these affections has become universal. In erysipelas the sesquichloride of iron has also, apparently, a specific controlling influence.

When the disease is associated with active inflammations, particularly of the serous membranes—as in cerebro-spinal fever and peritonitis—opium is the recognized remedy. Aside from these instances, we have no drugs which exert anything like a special action upon the morbid process itself, unless such an action may be attributed to the mineral acids, or the combination of carbolic acid and iodine in typhoid.

The antipyretic treatment may be carried out either by the action of cold upon the surface of the body, or by the exhibition of some of the drugs which are known to have this peculiar effect when given internally. The direct abstraction of heat—a method of which I have little personal experience—seems to be best accomplished by the use of the graduated bath of von Ziemssen.* The patient is immersed in the bath at a temperature of about 90° to 95° F.;

* H. von Ziemssen, "Klinische Vorträge"; "Antipyrese und antipyretische Heilmethoden," Leipsic, 1887.

this is gradually cooled, by the addition of cold water or lumps of ice, to 70 or 68 degrees.

The patient remains in the bath about fifteen minutes, or until he begins to feel chilly, at the end of which time he is replaced in bed and dried. If there is any coldness of the extremities, they are warmed by the application of heat, and if there is any feeling of exhaustion, some hot broth or mild stimulant is given. The internal temperature continues to fall for about half an hour after the patient is removed from the bath. At the end of that time the temperature should be taken, preferably in the rectum, and if there is a fall of from two to three degrees C. it is considered sufficient. When the fever heat again rises to the point which is considered dangerous, the bath is repeated; 103.5° to 104° F. is considered to be the proper indication for the commencement of the treatment. In the use of the cold bath, which is the form recommended by Liebermeister, the patient is at once immersed in water at a temperature of 70° . The length of time for the bath is ten minutes; the effects obtained are the same as those of the graduated bath. The cold bath, however, is not deemed so advisable as the graduated where there is great adynamia, and neither one should be used if there is intestinal hæmorrhage, perforation, or a tendency to collapse.

The cold pack is another method, but is stated by Liebermeister to have only about one fourth the efficacy of the cold bath. The simpler method of sponging the body with cold water, while very grateful to the patient, has little or no antipyretic effect unless continued for a long time.

Though highly recommended by many European authors, it is doubtful if the antipyretic treatment is as useful as it has been represented to be. American practitioners have never found it necessary to resort to it as frequently as has been done in Europe, but their results are probably as good.

It seems probable to me that the injurious effects of temperatures under 105° F. have been considerably overestimated, and Dr. Da Costa, who recommends the cold bath, states that it is not necessary to employ it unless the temperature reaches that height.*

That good effects do follow the use of the antipyretic treatment is unquestionable, but whether these effects are due to reduction of temperature or to the improved condition of innervation which results from their use is the question. The same effect upon the nervous system can be attained by cool sponging of the body, which reduces the temperature very slightly, and I have been informed by Dr. Daniel Ayres that he has seen similar results follow the oiling of the surface of the body in fever patients. I am not aware that oiling the surface brings about any reduction of temperature.†

It is also not improbable that the benefits to be derived from cold bathing, even aside from the reduction of temperature, have been overstated by Liebermeister and others. Eichhorst, who recommends the practice in typhoid fever, makes the moderate statement that an improved condition of the nervous system not infrequently follows the use of the cold baths, and Struempell also is very guarded in his recommendation of them. It has further been ascertained by Senator, by a comparison of the statistics of the different hospitals of Berlin, that in the Augusta hospital, where the antipyretic treatment has not been used, the percentage of recoveries from typhoid fever is greater than in those institutions in which this method has been employed.‡ It

* Introduction to J. C. Wilson's "Treatise on the Continued Fevers," New York, 1881, p. xvi.

† Von Ziemssen states that the *warm* bath has the same effect on the nervous system, the difference between this and the cold bath being that the former does not reduce the temperature. (*Op. cit.*, p. 26.)

‡ "Dtsch. med. Wchnschr.," 1885, p. 733.

is probable that, with the more extensive use of the recently discovered antipyretic drugs, antipyrine and antifebrine, the cold baths will gradually fall into disuse.*

An additional advantage which these drugs have over the direct abstraction of heat by means of cold water is that they cause an actual diminution of the production of heat in the body, whereas the cold bath exerts no such influence. It is stated by Niemeyer, as the result of experiments by Liebermeister, that the production of heat is actually increased by the use of the cold bath.† But even if there were no actual increase, but the production simply remained the same, while the temperature was lowered by the more rapid abstraction of heat, antipyrine and antifebrine would still be more useful. The other antipyretics—namely, quinine, aconite, and digitalis—are not so useful on account of their depressing qualities, and they will probably be entirely replaced in the future by antipyrine and antifebrine.

These drugs may be employed either by the stomach, rectum, or subcutaneous injection, without annoyance to the patient, or the necessity of so many trained assistants, and with just as favorable if not more favorable results. If deemed advisable, it is possible, by their use in moderate and regularly repeated doses, to retain the temperature at almost any point deemed advisable. Whether, however, this is necessary in ordinary cases is doubtful. Many cases of typhoid and other infectious fevers run their course with moderately high temperatures, but with no very alarming symptoms, and many of the worst cases, particularly of the

* Liebermeister himself stated, before the discovery of antipyrine, antifebrine, etc., that, were it necessary for him to choose between the cold bath and quinine in the treatment of typhoid, he would in most cases take quinine. (Von Ziemssen's "Cyclopædia of the Pract. of Med.," Am. transl., New York, 1874, vol. i, p. 216.)

† See also Liebermeister, "Antipyretische Heilmethoden," Von Ziemssen's "Handb. d. allg. Therapie," Leipsic, 1880, Bd. i.

septicæmic conditions, and also of typhoid, show no hyperpyrexia from beginning to end. Indeed, it would seem that a certain increase in the temperature of the body is a part of the normal course of a febrile disease, and that, unless it reaches a hyperpyrexial degree, it may be safely let alone. If, however, the temperature rises above 105° , it becomes dangerous, and in that case it must, if possible, be controlled by antipyretic remedies. The point which I wish to make in regard to the antipyretic treatment is that it should not be too hastily adopted, that the physician should not allow his attention to be too exclusively occupied by this one symptom to the neglect of others which are in many, if not in the majority of cases, more important, and that the great majority of cases of fever will run their course favorably without any antipyretic treatment whatever. The attention of the physician should be especially occupied in watching the development of collateral symptoms, which should be combated, where they require it, according to the well-recognized rules of therapeutics. He should always bear in mind that there is more danger of over-treating than of under-treating the patient.

Where we are unable to apply specific remedies, our object should be, first of all, to attend to the general nutrition of the body; second, to maintaining the strength of the patient by stimulants where food is inadequate to this end; third, combating unfavorable symptoms in the nervous and vascular systems; and, lastly, to the artificial reduction of the temperature, if this should attain a dangerous height.

The treatment of the symptoms connected with the nervous system will vary according as their type is sthenic or asthenic. The headache, restlessness, and more or less active delirium observed in the course of the more sthenic fevers, and at certain stages of those of the asthenic variety, are best controlled by agents which act as sedatives upon

the nerve-centers without diminishing the secretions. These are the bromides, chloral, urethane, and paraldehyde. In mild cases the bromides, particularly at night, are sufficient. Where the restlessness is more pronounced, and insomnia is a marked symptom, chloral in moderate doses is beneficial. In the administration of this drug the best results are obtained by giving two or three moderate doses—say ten grains to an adult at intervals of two hours, beginning early in the evening. By this plan we avoid any danger of too great a depressing effect upon the heart, and secure a gradual and somewhat cumulative soporific effect. When it is not thought safe to use chloral, and we desire a purely hypnotic effect, paraldehyde, in doses of from one to two drachms, or urethane, thirty to forty grains, may be given with safety, and with almost absolute certainty of obtaining a beneficial result. In the low delirium and vigilance of the asthenic fevers the best sedative is opium, and the best form of administration is that of a pill. The ordinary dose is from half a grain to a grain every three or four hours. This may usually be omitted for a few hours in the early part of the day, when the tendency to delirium is least marked, and resumed in the afternoon. It may be advantageously combined with quinine, camphor, or the monobromide of camphor. When the mucous membranes and skin are very dry and harsh, I believe it to be advisable to combine small doses of calomel with the opium. This is a plan of treatment recommended by Dr. George B. Wood,* and, though I would not carry it as far as he did—that is, to the point of slight salivation—still I believe that its moderate use is often followed by very salutary effects. This treatment should not, however, replace the free and regular exhibition of alcohol. In instances where the delirium is maniacal, and it is important to quiet the patient quickly,

* "Practice of Med.," Philadelphia, 1858, vol. i, p. 357.

subcutaneous injection of morphine should be resorted to, but only as a temporary expedient. In addition to these measures, it may be well, when the delirium is active, to apply cold to the head.

Circulatory disturbances are also to be treated according to their active or adynamic character. When the pulse is rapid, strong, and resistant, the heart's action forcible, and its sounds clear and distinct, it may be well, even if this occur in the early stages of fevers of the typhoid type, to use some arterial sedative. Frequently the agents used for the control of the nervous condition will also affect this. If any other drug is employed, it should be one as little depressing as possible. Probably the best of the arterial sedatives for use in such cases is *veratrum viride*. While this drug exerts a potent effect in lowering vascular pressure, it is known to be almost free from danger. Its effects are not of long duration, and it appears to produce no lasting debility. For these reasons it is much better adapted to the treatment of the early stages of typhoid fever than *aconite*, the use of which can not but be fraught with more or less danger, inasmuch as we can not know at what time the disease will assume the asthenic type. In doses of three or four minims of the fluid extract at intervals of two to three hours, *veratrum viride* is, I believe, a perfectly safe arterial sedative. When the heart begins to flag, and the pulse becomes soft and non-resistant, the alcohol and opium, which are usually demanded for the relief of other symptoms, will be sufficient for this. If, however, some re-enforcement of the treatment be necessary, the best agent that we have at our command is the oil of turpentine. This can be given in three-to-five minim doses, either in a capsule with the opium, or by itself in an emulsion. Its disagreeable taste may be overcome by the addition to the mixture of a few drops of the oil of gaultheria. In typhoid

fever turpentine is also useful for its direct effect upon the intestinal mucous membrane. Attention was first drawn to this fact by Dr. George B. Wood (*l. c.*), and its value has been attested by many experienced practitioners since his day. The dryness and heat of the skin of fever patients are most pleasantly relieved by sponging the surface with cool water, to which alcohol, bay rum, or Florida water may be added. When, on the contrary, there is profuse sweating, acetic acid or vinegar may be added to the water, and, if this be not sufficient, a grain of the oxide of zinc, with a twelfth or eighth of a grain of the extract of belladonna, may be given in a pill every three hours. When pulmonary complications present themselves in the form of asthenic bronchitis or pneumonia they call for an increase in the amount of stimulants, and usually for the exhibition of some stimulating expectorant. It is not necessary for the purpose to introduce any other agent than those already mentioned, as there is nothing more useful in these cases than alcohol, quinine, and the oil of turpentine. Carbonate of ammonia may be of use, but, I think, is not as desirable as the drugs already alluded to.

When in the course of the infectious fevers there is a marked diminution in the quantity of urine, with the appearance of albumin or of the morphological elements which indicate the existence of nephritis, the treatment will depend upon the character of the collateral symptoms. Should there be no marked evidences of uræmic poisoning, it may be best not to adopt any special medication. If, however, the signs of uræmia are well marked, we should give a mild hydragogue cathartic, and, if this is not sufficient, should endeavor to induce copious perspiration. This can be best done by the hypodermic injection of from one eighth to one sixth of a grain of the nitrate or muriate of pilocarpine. This may be preceded by the use of the cold

pack, and should be accompanied by an increase in the amount of alcoholic stimulants.

I can not close this paper more appropriately than by quoting the following sage remarks of that able clinical teacher, Professor J. M. Da Costa: "Yet, to treat a case with the best chance of success, still something else is required—the practical skill which takes note of the epidemic influence prevailing; which recognizes that all cases are not alike because they bear the same name; which does not overlook that, in the same disease, apparently the brunt may fall primarily on this organ or on that organ, that the nervous system or the circulation may suffer disproportionately and exceptionally from the onset, or, as in fevers of the worst form, be overwhelmed together; which lays stress on peculiarity of causation, of temperament, of constitution; which sees, therefore, not only the disease in the sick man, but the sick man in the disease."



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